



foia
Jeanne Briskin to: Leigh DeHaven

06/22/2012 03:55 PM

Jeanne Briskin
Office of Science Policy
Office of Research and Development
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W. (8104R)
Washington, D.C. 20460
(202) 564-4583 - office
(202) 565-2911 - fax
briskin.jeanne@epa.gov

Address for Deliveries:
US EPA
Ronald Reagan Building --Room 51144
Washington DC 20004

----- Forwarded by Jeanne Briskin/DC/USEPA/US on 06/22/2012 08:46 AM -----

From: "King, George" <George.King@apachecorp.com>
To: Jeanne Briskin/DC/USEPA/US@EPA
Date: 05/23/2012 02:16 PM
Subject: RE: SPE HF course

Jeanne,

Absolutely, I'm free most of next week from Tuesday through Thursday.

As background, the shale course can be one day or two day depending on the level of detail needed. A course description is attached and I can provide a full set of slides on request. If we have the Society of Petroleum Engineers as the main provider (doesn't change anything in the course), they can give continuing education credit for the course. If not through them, it's the same materials without credit.

My background and publication list is at www.GEKEngineering.com My Estimating and Evaluating Frac Risk is in the Downloads section.
I am an approved reviewer for DOE's Geothermal Projects and attended the DOE Review meeting in Denver, 7-10 April 2012.

George

George E. King
Apache Corporation
Distinguished Engineering Advisor
1 713 296 6281 (office)

1 281 851 8095 (mobile)

From: Jeanne Briskin [mailto:Briskin.Jeanne@epamail.epa.gov]
Sent: Wednesday, May 23, 2012 12:51 PM
To: King, George
Subject: SPE HF course

Hi George,

It was good to see you at the recent NSF workshop. We would be interested in having the SPE course on hydraulic fracturing in shale presented at EPA in Washington. Is there a convenient time we could talk in the next week or so, so I can gather more information so I may figure out with our admin folks on how we might proceed with this?

Thanks,

Jeanne

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Washington DC 20004SPE Shale Gas Completions Fracturing and Production.docx
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From: "King, George" <George.King@apachecorp.com>
To: Jeanne Briskin/DC/USEPA/US@EPA
Date: 05/23/2012 02:47 PM
Subject: RE: SPE HF course

Jeanne,

I forgot to include the detail on objectives (attached).

George E. King
Apache Corporation
Distinguished Engineering Advisor
1 713 296 6281 (office)

1 281 851 8095 (mobile)

From: Jeanne Briskin [mailto:Briskin.Jeanne@epamail.epa.gov]
Sent: Wednesday, May 23, 2012 12:51 PM
To: King, George
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Washington DC 20004SPE Shale Course Description.xlsx

Shale Selection, Completions, Fracturing, and Production

George E. King, PE

Description

This 2-day course acquaints participants with the basics of oil and gas shale evaluation and current shale selection, well completion, fracturing, and production technologies for shale reservoirs. The interactive format includes field data, current approaches and use of technologies suited for shale developments. Technologies include logging, frac interval selection, multi-stage fracturing in horizontal wells, and a summary of field data from many shale plays. Topics include:

- Candidate selection criteria to identify shale “sweet spots”
- Complex fractures and role of geomechanics
- Well orientation, optimum length and perf cluster design
- Optimizing well completions and stimulations
- Fracturing risk estimation: strengths and areas to improve
- Water sources, treatment, reuse and disposal
- Predicting production, estimating decline and well start-up suggestions
- Surface equipment and production operations

Who Should Attend

This course is for all well completion and production engineers, managers, geologists and regulators working with shale reserves.

Why You Should Attend

The technology for recovering oil and gas reserves from shale is changing the face of the industry worldwide. If shale reserves are part of your portfolio, this course is for you.

Special Requirements

There are no special requirements for this course.

CEUs

1.6 CEUs (Continuing Education Units) are awarded for this 2-day course.

George E. King, PE, worked for Amoco production from 1971 to 1999 and BP from 1999 to 2008. He is now with Apache, where he assists on shale stimulations, production chemistry and workovers. Mr. King has written more than 65 technical papers and a book on completions and workovers. He was a 1985 SPE Distinguished Lecturer, and 1999 SPE Short Course Lecturer. Industry positions include Technical Chair of 1992 SPE Annual Meeting, API subcommittee chair on perforating, Adjunct Professor at the University of Tulsa (teaching well completions and fracturing), and numerous SPE committees. He was awarded the 2004 SPE Production Operations Award and is the 2012 Engineer of the Year for the Greater Houston Region of the Texas Society of Professional Engineers.

Mr. King holds a bachelor's in Chemistry from Oklahoma State University, a bachelor's degree in Chemical Engineering, and a master's degree in Petroleum Engineering from the University of Tulsa.

Section	Description	Delivery Outcome Sought	Time
1	Brief intro to shales - what they are, where they are, gas and oil in place and supply potential	General knowledge of shale's potential in supplying energy.	1/2 hr.
2	Assess General Gas and Oil Production Potential and Select Limiting Factors in Shale Hydrocarbon Production	Know the main selection criteria and how, where and through what methods to attain it. This is an intro to the critical shale factors needed to produce gas or oil from a shale.	1.5 hrs
3	Estimate potential for initial production. Explain IP(30), EUR, Stimulated rock volume, stress dependent complex fracturing, basics of fluid flow through the shale.	Know enough about shale gas and oil flow to assess a moderately complex shale development. Know what is behind the SRV estimations and the EUR projections.	1.5 hrs
4	Formulation of a basic shale development from seismic requirements to exploratory wells and on through pads, gas and oil transport, water supplies for drilling and fracturing.	Be able to describe the general approach to selection of a pad or single wells, vertical or horizontal wells. Understand the basic layout and requirements of an operating shale development.	1 hr.
5	Well Completion design including well orientation, length, pipe size, toe-up or toe down, and azimuth. Completion design includes basics of casing and tubing selection, cementing requirements and general well architecture and how completions vary with geology.	Be able to review a new completion design for basic fitness of production and raise awareness of risk elements of completion and following operations. Know the quality and longevity of basic barriers.	2.0 hrs
6	Pre Frac considerations including fracture stage selection, perforation design for cluster location, spacing, charge type and hydraulic diversion needs. Determine if there are potential frac barriers and how they can be tested.	Be able to take logs, mud logs, gas shows, geologic studies and other critical shale information from data gathering steps and select locations for the stages and clusters. Select initial well and frac monitoring methods and demonstrate a knowledge on how and when to use monitoring.	1.5 hrs
7	Fracturing design, including fluid and proppant selection, pressure limits, rates, proppant loading and volumes. What formation factors suggest that a complex or planar frac is expected. Refrac potential and simul stimulation methods.	Be able to design a basic frac, select a fluid, estimate volumes, read a frac chart and explain what monitoring methods can answer frac placement questions. Know how to spot frac problems and warning signs as well as how to estimate frac risk impact and occurrence. What monitoring methods are useful at what stage of development.	4 hr
8	Flowback strategies and realities of operation.	Estimate a flow back rate and what volumes would be expected over what time. What are the elements in frac and produced water, what are the risks and when is flowback over? How can real emissions be curtailed or eliminated.	1 hr.
9	Water for fracs; replacing fresh water with saltine source water and produced saltwater. What is involved and what are the resources?	Have a working knowledge of how to select or generate a quality frac water source from produced or source salt water.	1 hr.
10	Hot Button Issues - what are the facts and what d we need to improve.	Cover methane migration, fugative emissions, water issues, reduction of trucks and greener chemicals	1 hr.

